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Author(s)	Huzioka, Kazuo
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ON THE OCCURRENCE OF A NEW SPECIES OF NATHORSTIA IN JAPAN

By

Kazuo HUZIOKA

With 1 plate

(Contribution from the Department of Geology and Mineralogy, Faculty
of Science, Hokkaidô Imperial University, Sapporo ; No. 215).

In this article the writer wishes to report the occurrence of a new species of *Nathorstia* from Japan. Unfortunately the specimens are all sterile, but from the observable morphological features it seems justifiable to include the specimens in the genus above referred to rather than in any other genera of fossil plants. The specimens were collected by Prof. S. ÔISHI from a dark gray shale at Nisinotani* near Ryôseki, Kôti Pref., Sikoku Island, together with numerous other specimens of fossil plants, and were submitted to the writer for examination. The associations are as follows (determined by Prof. ÔISHI) :

Marchantites Yabei (KRYSHI.)
Onychiopsis elongata (GEYL.)
Cladophlebis distans (HR.)
***C. Takezakii* ÔISHI
C. argutula (HR.)
***C. cystopteroides* ÔISHI
***C. parvula* ÔISHI
Sphenopteris sp.
Pachypteris sp. indet.
Zamiophyllum? sp.
Ptilophyllum pecten (MORRIS)
Nilssonina orientalis HEER
Nilssonina shaumburgensis (DUNKER)
Brachyphyllum japonicum (YOKOYAMA)

* 高知縣長岡郡新政村西ノ谷.

** For description, see S. ÔISHI : Mesozoic Floras of Japan (in preparation).

The fossiliferous rock belongs to the Ryôseki Series.

At this place the writer wishes to express his sincere thanks to Prof. ÔISHI who has given him valuable suggestions during the course of the present work.

GENUS *Nathorstia* HEER, 1880

The genus *Nathorstia* was established by HEER⁽¹⁾ in 1880 for some imperfect fern fronds in fructified condition derived from the Lower Cretaceous (Urgonian) of Greenland, and at the same time he transferred some fern fragments with sori from the Kome bed of Greenland which he formerly identified with *Danaeites firma* HEER to his new genus. HEER defined *Nathorstia* as follows:

“Frons pinnata, coriacea; pinnulae liberae, sessiles, elongatae, interrimate, nervo medio valido, nervis secundariis subtilissimis, angulo recto vel subrecto egredientibus, numerosis, simplicibus vel furcatis. Sori globosi vel oblongo-ovales, biseriales, nervo medio valde approximati, a margine remoti; sporangia pauca in orbem disposita.”

As to the taxonomic position of *Nathorstia*, HEER suggested its belonging to the Marattiaceae on the basis of the sorus, in which the sporangia form a circular group around a central hollow just as seen in the living *Kaulfussia*.

Later NATHORST⁽²⁾ discussed the genus *Nathorstia* based on some splendidly preserved material from the Cenomanian of Atanekerdluk of Greenland which he named *Nathorstia latifolia* NATH. He revealed several important points as to the soral structures not yet mentioned in HEER's work, accepting HEER's view that *Nathorstia* very closely resembles *Kaulfussia* in its soral characters. Later discovery of another distinct species of this genus from Patagonia⁽³⁾ amply justified the marattiaceous affinity of *Nathorstia*.

Under this generic designation several specimens have been described chiefly from the European Cretaceous rocks by several authors. However they were mostly only small portions of fronds

(1) O. HEER: Nachträge zur fossilen Flora Grönlands. Kgl. Sv. Vet. Akad. Handl., Bd. 18, No. 2, 1880, p. 5.

(2) A. G. NATHORST: Ueber *Nathorstia* HEER. Ibid., Bd. 43, No. 6, 1908, p. 14, Pl. III.

(3) T. G. HALLE: Some Mesozoic Plant-bearing Deposits in Patagonia and Tierra del Fuego and their Floras. Ibid., Bd. 51, No. 3, 1913, p. 20, Pl. I, Figs. 1-9.

in sterile condition and most of them are hardly specifically determinable. According to HIRMER and HOERHAMMER,⁽¹⁾ who recently summarised the fossil and recent Matoniaceae of the world, certain specimens which have been called by several authors under different names seem to be included in this interesting genus *Nathorstia*.

The previous occurrences of the genus *Nathorstia* were almost confined to the Cretaceous. However, if the revision made by HIRMER and HOERHAMMER as to the fossil specimens hitherto having been considered to belong to the matoniaceous genera is accepted, then the most ancient occurrence of this genus may be as old as the Liassic.

It is highly questionable whether the present sterile specimens had sori of *Nathorstia* type, and this is especially so as there are a number of species with similar venation yet considered as belonging to distinct genera or even families on the basis of fructification. In deciding the generic position of the present specimens, the writer brought into comparison the vegetative characters available of *Nathorstia alata* HALLE⁽²⁾ from Patagonia, the sori of which were fully investigated, and with which the vegetative characters are most comparable among many fossil plants with similar characters.

Nathorstia Oishii sp. nov.

Pl. LV (I), Figs. 1, 1a, 1b, 2.

(Type-specimen: Fig. 1).

Diagnosis: Frond pinnate, more than 1 cm. long, probably linear; rachis moderately strong, 1–1.5 mm. broad, expanded at the base and confluent laterally, tapering gradually towards the acuminate apex and at a wide angle or nearly a right angle to the rachis; midrib sharply defined, straight and persisting to the tip; secondary veins at a wide angle to the midrib, branch before they reach the margin into finer tertiary and quaternary veins anastomosing to form fine, polygonal and isodiametrical meshes; between two any adjacent secondary veins is a low archæad; between two adjacent midribs finer veins spring off direct from the rachis, and branch and anastomose with tertiary and quaternary veins. Fructification unknown.

(1) M. HIRMER and L. HOERHAMMER: Morphologie, Systematik und geographische Verbreitung der fossilen und rezenten Matoniaceen. *Palaeontographica*, 81, B, 1936.

(2) T. G. HALLE: *Loc. cit.*, 1913.

Remarks: Several fragments of fronds are at hand, of which one in Pl. LV, fig. 1 shows the venation most distinctly. Enlarged figures of a part of the specimen are shown in figs. 1a and 1b. Another specimen in fig. 2 is also a part of a frond a little larger than the preceding one. However it was also included in the same species, as the venation, though it was less distinct in this, was similar in the two specimens.

Comparison: In respect to the vegetative characters the present species is comparable with *N. latifolia* NATH.⁽¹⁾ from Greenland and *N. alata* HALLE⁽²⁾ from Patagonia. In the former, however, the pinnae are decidedly longer and broader, the breadth being twice or thrice as great as in the present specimen. It is with the Patagonian species that the present species is most comparable. In the Patagonian species, the long and narrow pinnae, very closely related in form and size to those of the present species, are attached to the rachis at a wide angle with an expanded base just as in ours. Therefore, so far as the external characters mentioned above are concerned the two species seem to be specifically not separable. However, there is a distinction in respect to the venation, the characteristic archaead between two adjacent secondary veins being absent in the Patagonian species, though otherwise the venation are alike.

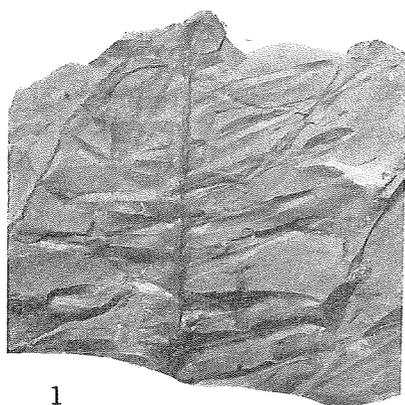
EXPLANATION OF THE PLATE LV (I)

Nathorstia Oishii sp. nov.

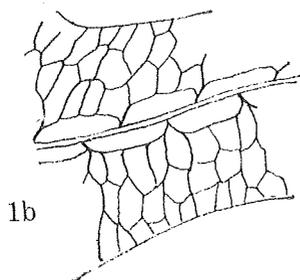
- Fig. 1. Type-specimen, $\times 1$. (Reg. No. 7841).
 Fig. 1a. Ditto, $\times 4$. The venation is very distinctly impressed.
 Fig. 1b. Ditto, $\times 8$.
 Fig. 2. A larger specimen, $\times 1$.
 Loc. Nisinotani, Sinkai-mura, Nagaoka-gun, Kôti pref.

(1) A. G. NATHORST: Ueber *Nathorstia* HEER. Loc. cit.

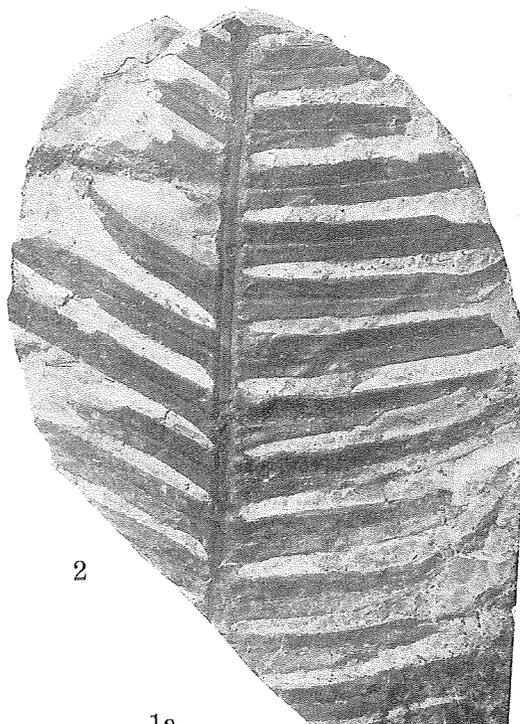
(2) T. G. HALLE: Loc. cit., 1913.



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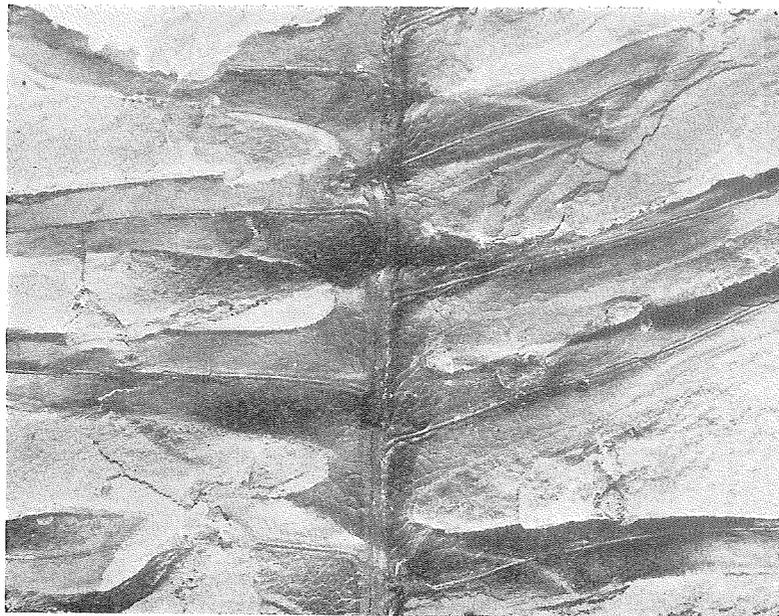


1b



2

1a



Takeda photo

K. Huzioka: On the Occurrence of Nathorstia